3.6 Frequency Domain Results

Theorem 3.6.1 (Asymptotic behavior of Fourier Coefficients)

If f_T and it's first m derivatives are continuous, but $f_T^{(m+1)}$ is discontinuous then,

$$|a_k| < \frac{C}{k^{m+2}}, \quad |b_k| < \frac{C}{k^{m+2}}, \quad |C_k| < \frac{C}{k^{m+2}}$$

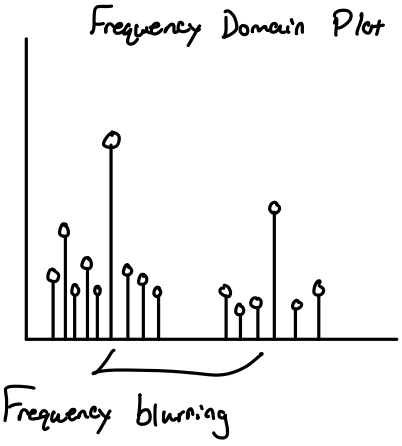
Corollary 3.6.1 (Asymptotic behavior of Fourier Coefficients, Special Cases)

(a) if f_T is dicontinuous ($m=-1$), then C_k goes to zero on the order of $1/k$.
(b) if f_T is continuous but f_T' is dicontinuous ($m=0$), then C_k goes to zero on the order of $1/k^2$.
(c) if f_T and all of its derivatives are continuous, then C_k goes to Zero on the order of $1/k^m$

Definition 3.6.1 (Frequency Blurring)

Let f satisy the dirchlet conditions,

The frequency domain graph of f is said to have frequency blurring if there is a clustering of nonzero Fourier coefficients near the dominant frequencies



Calculating C_k

$$C_k = \frac{1}{T}\int_0^T f(t)e^{ikwt}$$